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The Effects of Unsuccessful Retrieval Attempts and Depression on Recall

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Abstract

Test-taking improves recall more than just studying for the same amount of time (Rohrer, Taylor, & Sholar, 2010). This is true even for unsuccessful retrieval attempts (URA); (Kornell, Hayes, & Bjork, 2009). We hypothesized that depression would reduce URA benefits even more than it does regular recall, since testing effects critically depend on effortful, elaborative processing. Forty undergraduate students were randomly assigned to one of four conditions: depressed read-only, depressed test, neutral read-only or neutral test. Mood was manipulated with a Velten Mood Induction Procedure (1968), for group administration using PowerPoint projection. In the test condition, subjects were asked questions over studied material that almost always led to an incorrect response. We found benefits of URA; however our mood induction was not successful. We did find that subjects with pre-existing, higher levels of depression did not experience URA benefits, while those with lower levels of depression did. This study suggests that depression interferes with the URA effect, but needs to be replicated with a successful experimental mood manipulation to demonstrate a causal relationship.

The Testing Effect

It is well established that testing improves recall – this is known as the Testing Effect (TE; see, Karpicke & Roediger, 2006). For example, the TE was found in a study of 4th and 5th graders, half of whom were given practice tests prior to the final test and the other half of whom just studied. Recall on the final test was greatly improved for those subjects who had taken practice tests (Rohrer, Taylor, & Sholar, 2010). Toppino & Cohen (2009) found that the TE for college students. Chan (2010) found that testing even improves memory for related, but untested, material.

Unsuccessful Retrieval Attempts

Kornell, Hayes, & Bjork (2009) found that testing improves later recall even when the subject answers practice test questions incorrectly. This benefit from unsuccessful retrieval attempts (URA) is found as long as the subject is provided with the correct answer immediately after practice testing (Kang, McDermott, & Roediger). Richland, Kornell, & Kao (2009) found evidence of URA benefits even when the test was given prior to any study. Carpenter (2009) reported that activation of elaborative information occurs at a greater rate during testing than studying and may be one of the underlying mechanisms for the testing effect in general.

Depression

Depression impairs recall (Burt, Zembar, & Niederehe, 1995). While the nature of the relationship between depression and memory is complex, and a variety of mechanisms have been explored, one suggestion is the Resource Allocation Model (RAM). According to the RAM depression triggers task irrelevant cognitions that impair memory by reducing cognitive resources available for information processing (Ellis & Ashbrook, 1988; Levens, Muhtadie, & Gotlib, 2009). RAM suggests that depression would especially decease URA benefits, since these depend substantially on elaborative processing.

Hypotheses

1. Unsuccessful retrieval attempts, will increase later recall compared to the same amount of time on task spent in studying the correct answer.
2. Depressed subjects will show less benefit of URA than non-depressed subjects.

Method

Participants

- 40 undergraduates

Materials

- The Beck Depression Inventory (BDI) (Beck, 1967)
- The Velten Mood Induction Procedure (VMIP; Velten, 1968).
- The Adjective Checklist (ACL; Lubin, 1965)
- 59 Word Pairs (Nelson, McEvoy, & Schreiber, 1998)
- A two-minute audio clip from Jeff Foxworthy's stand up routine *"Every Single Hair on Her Body" (Foxworthy, 1998)*

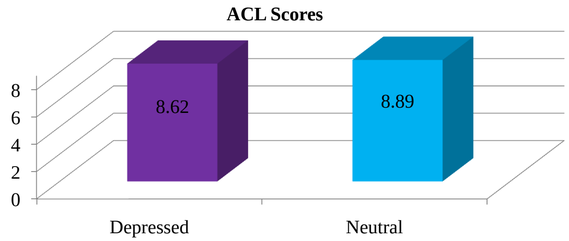
Procedure

Subjects were administered the BDI and then randomly assigned to one of four conditions: neutral/test, neutral/read-only, depressed/test, & depressed/read-only. They were then given the VMIP, modified for group administration with subjects viewing statements projected via PowerPoint onto a screen, and administered the ACL as a mood check.

Subjects were then exposed to the word pairs. In the read-only condition the read each word-pair for thirteen seconds; in the test condition they were exposed to the first word, and given eight seconds to supply the correct association (which they almost never did), and then exposed to both words for five additional seconds of study. Then both groups were shown one word in random order and asked to remember and write the correct word in that pair. All subjects were then re-administered the ACL, and exposed to the mood enhancing clip.

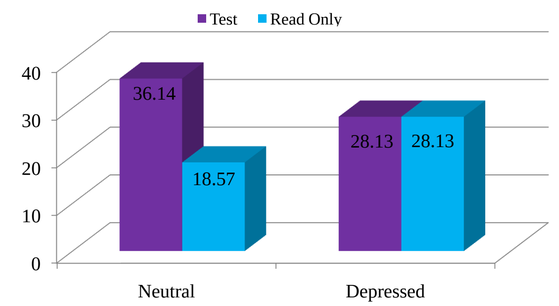
Mood Induction

Our mood induction was not successful. ACL scores of subjects in the depressed condition were not significantly higher than those of subjects in the neutral condition ($F(1, 53) = 38$, $p = .875$). We suspect this was a function of our subjects readings self statements from slides projected onto a screen rather than individual booklets.



Mood and URA Benefits

To investigate our hypotheses we created mood groups based on ALC scores (4 or lower = neutral; 9 or higher depressed.
As expected, we found an interaction between testing condition and mood; Neutral mood subjects showed URA benefits but depressed subjects did not ($F(1, 26) = 4.571$, $p = .042$).



Discussion

Hypotheses

As expected we did find benefits of unsuccessful retrieval attempts. Subjects who attempted to remember material, even though unsuccessful, had higher scores on a later recall test than subjects who spent the same amount of time just studying the material.

We were unable to evaluate our second hypothesis experimentally, induced depression would reduce these benefits, because our mood induction was unsuccessful. We were able to show that pre-existing levels of depression did reduce the benefits of unsuccessful retrieval efforts though because we did not randomly assign subjects to these mood conditions, we cannot draw conclusions about cause and effect.

Mood

The failure of our mood induction could have been a function of our modification of the technique for group administration. We presented each sentence on projected PowerPoint slides to the entire group, not in individualized booklets (see Velten, 1968). It is possible that successful mood induction requires the narrow focus of attention encouraged by individualized booklets, and that using the common screen allowed subjects to get distracted by other stimuli.

Our mood results are consistent with the Resource Allocation Model (Ellis & Ashbrook, 1988; Levens, Muhtadie, & Gotlib, 2009), which suggests that people who are depressed have less cognitive resources at their disposal to perform cognitive tasks.

Conclusions

The data from the current study are consistent with the recent literature supporting the efficacy of testing for improving memory – even when the subject is unable to retrieve the correct target during intermediate testing. Our study suggests that depressed subjects are less likely to experience these benefits, particularly relevant given the high rates of depression in college populations.